

Module 9 - Fiber Optics

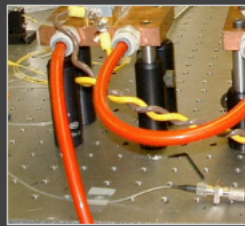
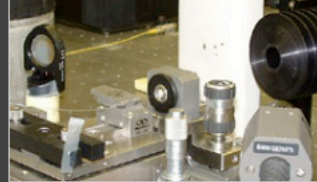
PDF Version

NOTE: It is recommended that you view the interactive online version for the best explanation of the laser-safety concepts.

Fiber Optics

After completing this module, you will be able to:

- define fiber optics.
- recognize special hazards associated with fiber optics.
- identify how to control fiber optics hazards.
- use the correct procedures when working with fiber optics.



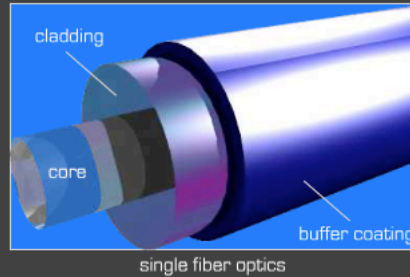
Audio Narration (slide 1)

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- Recognize special hazards associated with fiber optics.
- Identify how to control fiber optic hazards.
- Use the correct procedures when working with fiber optics.

Fiber Optics Defined

- thin strands of glass or plastic
- used singly
- can be arranged in bundles
- transmit laser light over distances



Audio Narration (Slide 2)

Fiber optics (optical fibers or cables) are long, thin strands of very pure glass or plastic about the diameter of a human hair. They can be used singly or arranged in bundles called optical cables, and are used to transmit light signals when it is impractical to use open beams and optics to transport a beam from one place to another. Shown here is an illustration of the components of a single optical fiber.


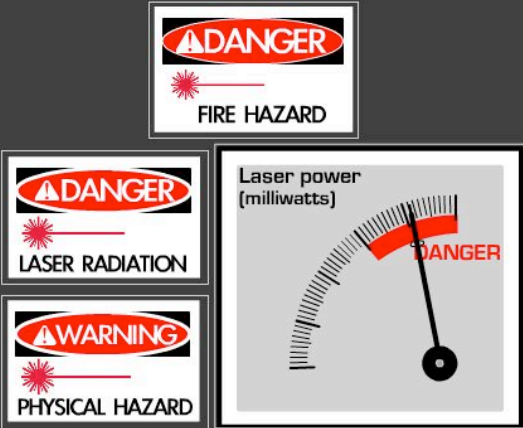
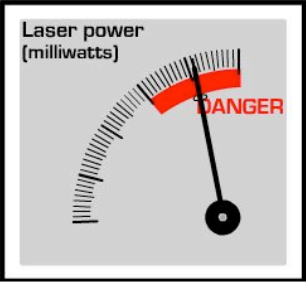
Fiber optics can be used to transport light from one laser or laser system to another. These systems are considered to be enclosed, with the optical cable forming part of the enclosure.

Fiber Optics Hazards

Treat Class 3B and Class 4 optics as beams of that power.

Hazards:

- fire
- radiation
- sharps

Audio Narration (Slide 3)

Fiber optics used to transmit Class 3B and Class 4 laser light should be treated as a laser of that power. Optical fibers that deliver high-power laser light can start fires if the fiber breaks.

Disconnecting live fibers can result in accessible radiation, possibly even above the MPE. Hazardous radiation levels also may be present at the ends of optical fibers.

Again, high-powered laser systems have the potential to start a fire.

Fiber optics can also be physically hazardous to handle. For example, making mechanical terminations requires the cladding be stripped off to expose a length of bare fiber, which can be extremely sharp. So, use extreme care when handling fiber optics.

Also, before examining the end of a disconnected fiber with an eye loupe make sure there is no laser light in the fiber. The eye loupe, a magnifying device, could focus a beam from the fiber into your eye.

Fiber Optics Hazards Controls

Apply necessary engineered and administrative controls:

- armored and fireproof cladding
- fireproof conduit
- label equipment
- cap off fibers when not in use
- use sharps containers



Audio Narration (Slide 4)

If disconnecting a connector would result in accessible radiation above the MPE, appropriate engineered and administrative controls consistent with the hazard classification shall be applied. Have your Laser Safety Officer help you devise the appropriate controls.

Since broken high-powered fibers are a fire hazard, protect the fibers from damage. Use armored or fireproof cladding or metal conduit when high power levels need to be transmitted over optical fibers.

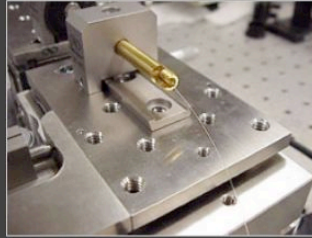
Properly label trays, cabling, and enclosures. Affix a laser hazard label at least every 3 meters. If hazardous radiation levels are present at the end of optical fibers, attach a CAUTION or DANGER label to the end of the fiber or fiber holder.

Cap off an optical fiber when not in use.

And put cleaved fibers into sharps containers.

Other Fiber Optics Concerns

- temporary laser controlled area.
- cover termination areas with black cloth.
- use sharps containers.
- properly label solvent containers.
- wear protective eyewear.
- keep flammables away from ovens and heaters.
- use appropriate protective eyewear to ensure there is no exposure above the MPE.



Audio Narration (slide 5)

If disconnection is necessary while a Class 3B or Class 4 beam is in a fiber, a temporary laser controlled area shall be set up, and a Laser Safety Officer evaluation performed if not already covered in the work and hazard control documentation.

Work areas where fiber optic cables are terminated should be covered with a black cloth to allow cleaved fibers to be seen easily. Again, use sharps containers to hold cleaved fibers for disposal, properly label solvent containers, and wear laser protective eyewear.

Flammables should be kept away from ovens and heaters used to cure the glues or epoxies used, depending on the termination method.

And again, use appropriate protective eyewear to ensure there is no exposure above the MPE.

Fiber Optics Quiz

Pretests and end-of-module quizzes are only available online. This quiz must be successfully completed. To do so, access the online course and go to the menu. Here, select module 9 and then advance through the slides until you reach the last slide (the quiz).